Why It Shouldn't Be So Hard to Write a System Specification

Ivy Hooks

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The Problem

- Government programs are:
  - Being conducted without system engineering processes and procedures in place
  - Reinventing the processes that work for large programs
- Those trying to reinvent process:
  - Have no knowledge of how processes are developed
  - Don't understand the existing processes
  - Prefer process tweaking to doing system engineering

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The Result

- Bad process that takes too long
- Participants who are totally frustrated
  - Constant change of rules
  - Debates about process not about real work
  - Lots of rework
  - Behind schedule before ever start real work
- No team – battle lines drawn
  - No discussion just debate
  - Everyone trained in how to do it wrong

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What has to Change

- Use proven processes
- Put process in place before team formed
- Scope before requirements
- Use small requirement writing team
- Determine right time to baseline
- Do allocation properly
- Put the right information in the requirement specifications

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No New Processes… Good Processes Already Exist

- Your program/project is not unique
- Tens of thousands of hours, reviews, revisions have been made to create really good processes
- Don't need
  - Shoot from the hip mentality
  - To fight the last war
  - Debate about process

NEED – DEFINITION AND DISCIPLINE

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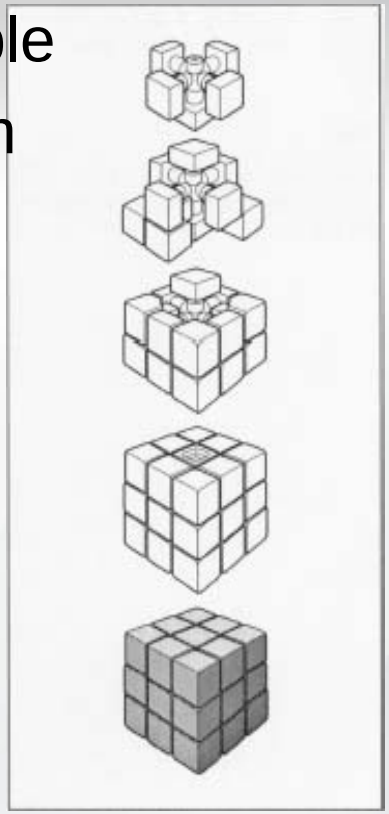
Process in Place

- Management team is responsible
- Major step before bringing team on board
- Cannot be done by committee
- Cannot be done by people with no experience
- Get someone to show you the way
- Do not mimic bad programs



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Scope First

- One more time –
  agree on the operational concepts first
  - Not just a DRM
  - Covers all life-cycle phases
  - Not concept of operations
- Management team responsibility
  - Prepare first draft
  - Read every version
  - Concur, support, and enforce

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Requirement Writing

- Use small team to do the writing
  - Highly trained
  - Good communication skills
  - Know scope backwards and forwards
- Make available the people who are requirement sources
  - Trained in basics
  - Support to writers is top priority
  - Familiar with scope information

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Change Control

- Always have some control but not CONTROL
- Control authority has to be knowledgeable about scope, requirements quality, and all requirements in consideration
- An individual has to ultimately be responsible
- No CONTROL until proper reviews

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Allocation

Allocation is the process by which requirements, defined at one level (system), are assigned to the parts of the system architecture (elements).

Allocation is NOT the process of writing derived requirements

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Allocation Process

- Is performed by system engineers after a majority of the set of requirements for a system have been defined and the system architecture has been developed.
- Assigns responsibility for implementation of a requirement to the element at the next level of the system architecture.
- Apportions resources among the elements where needed.

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How to do Allocation

- Every requirement in 3.2-3.6 should be allocated to the proper elements
- Every 3.7.x requirement is by default allocated to only element x
- Every 3.7.x requirement should trace back (have a Parent) in 3.2 – 3.6.

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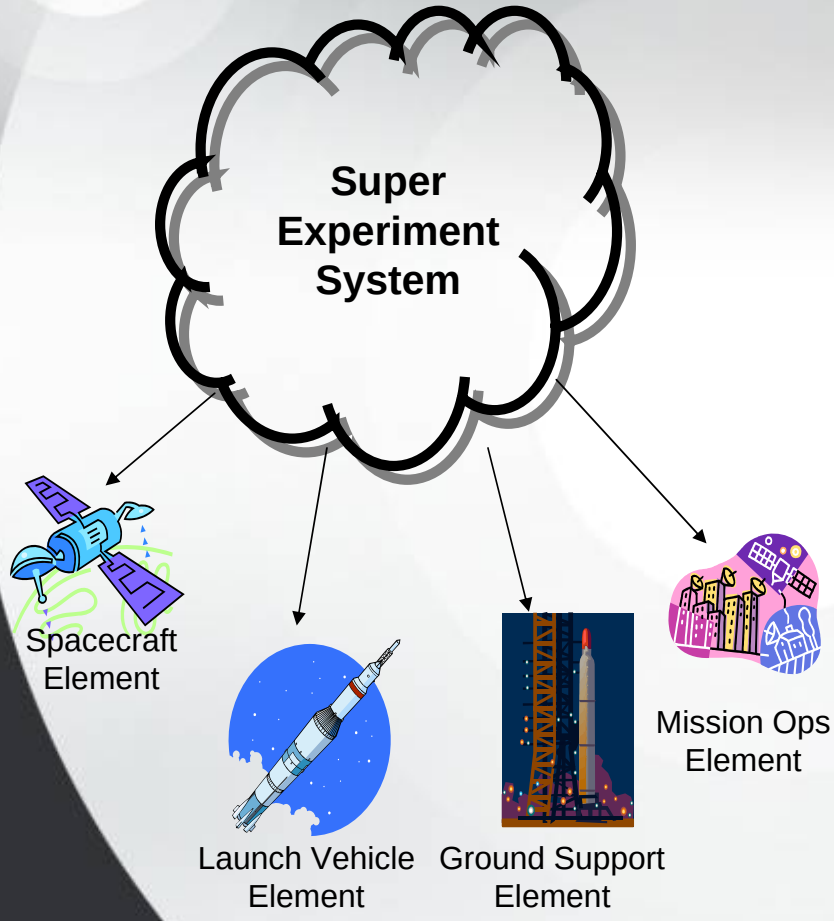
Allocation Example



3.2 The Super Experiment System shall perform science experiments.

3.7.1 The spacecraft shall provide payload volume as described in figure XYZ.

3.7.2 The launch vehicle shall place ABC pounds into orbit PDQ.

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Quality Tasks

- Assure that every requirement is allocated to an element and question those that are only for a single element
- Analyze the completeness of requirements on a per element basis
- Assess the possibility of interfaces
- Ensure that the allocation is achieved (after element requirements written and traced to parents)

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What goes in the System Specification

Section No.	Information
3	Intro for system requirements
3.1	Description of the system
3.2 – 3.6	Different types of system requirements
3.7	Intro for unique element level requirements
3.7.1	Element #1 intro
3.7.1.1	Element #1 description
3.7.1.2 -3.7.1.6	Different types of element #1 requirements
3.7.2	Element #2 intro
3.7.2.1	Element #2 description
3.7.2.2-3.7.2.6	Different types of element #2 requirements

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Interface Requirements Control

- Existing system uses an ICD
  - Belongs to the manager of the system with which you want to interface
  - Probably is not going to change
- Two sides in development – two options
  - Upper Level SRD – managed by SRD change board
  - IRD – managed and signed jointly by the managers of the two interfacing systems

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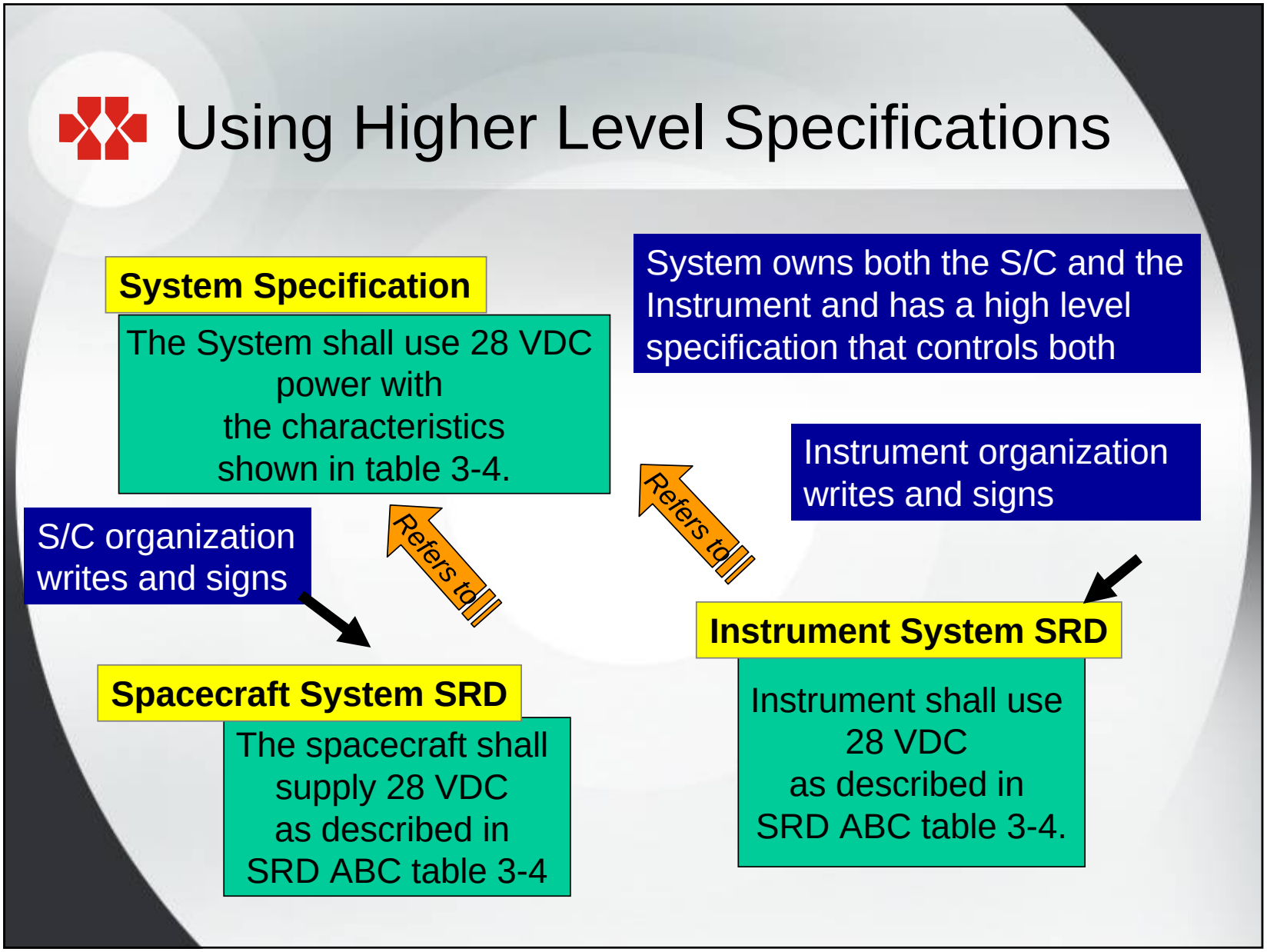
Using Higher Level Specifications



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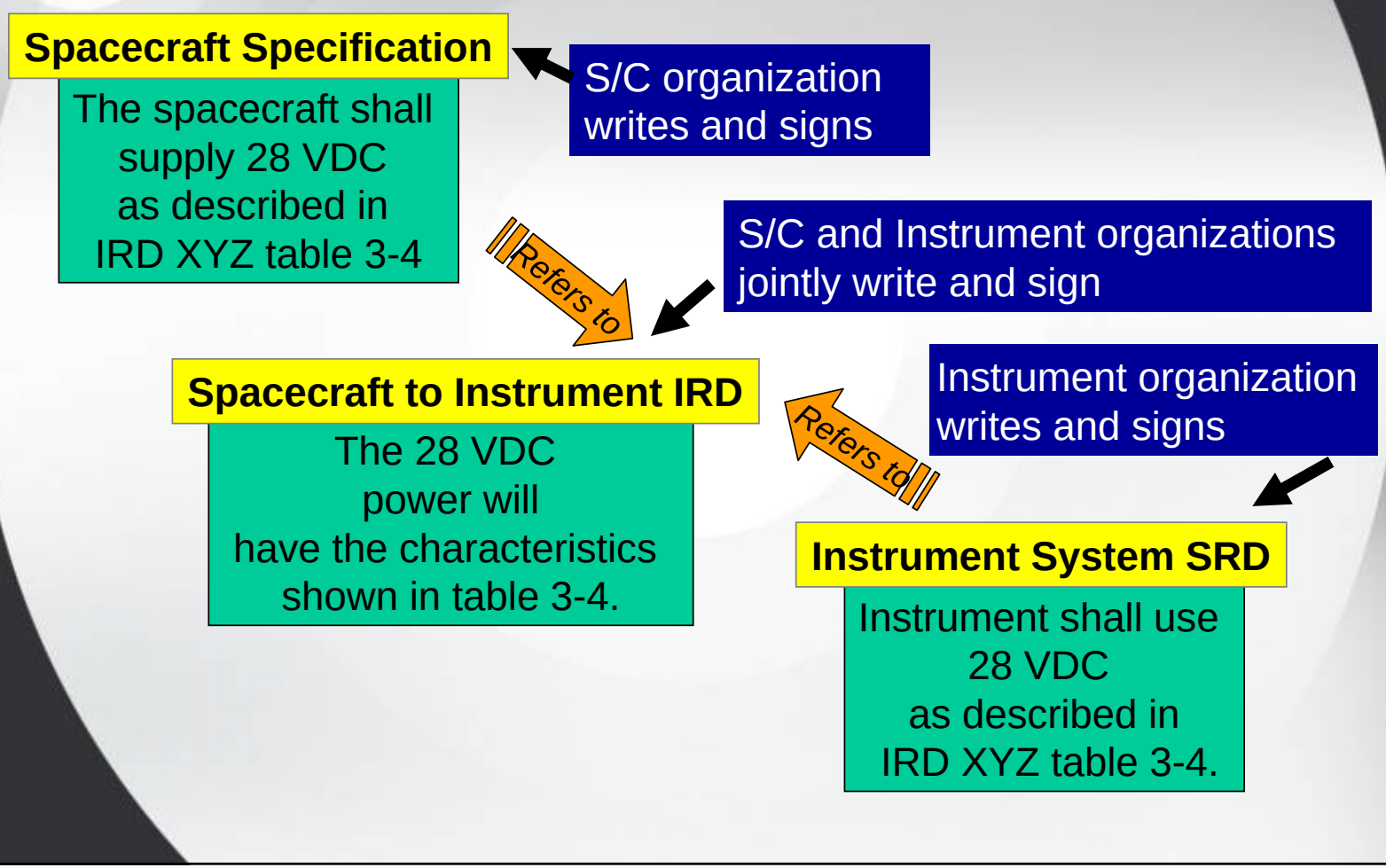
Using an IRD



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Summary

- Use existing processes for requirements management
- Develop the scope before the requirements
- Use small, highly trained teams to write the scope and the requirements
- Begin change CONTROL of requirements after proper reviews
- Allocate requirements to architecture elements not lower level requirement
- Put the right information in the requirement specifications

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